

The Canadian Entomologist

VOL. LVIII.

ORILLIA, NOVEMBER, 1926.

No. 11.

THE LIFE-HISTORY AND HABITS OF ANABRUS LONGIPES CAUDELL (ORTHOP).*

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In the fall of 1925 Mr. E. R. Buckell of Vernon, B. C. sent to me a number of eggs of *Anabrus longipes* Caud. about 30 of which hatched during the following spring. Of the nymphs secured from these eggs several were killed for examination at different stages of growth while most of the remainder were reared to maturity and kept until old age finally put an end to their existence.

It seems desirable here to emphasize the fact that the following notes are based entirely upon observations made with caged examples and that no opportunity has arisen to study the insect in its natural environment.

LIFE HISTORY

Egg, Elongate, cylindrical, somewhat narrowed at either end, straight or slightly arcuate in outline; surface polished, usually very finely reticulated, becoming granulated at the extremities, occasionally finely punctate without reticulation; color at first dull grey, later becoming dull white with a slight purplish suffusion. Length 8 mm., width varying with the growth of the embryo within.



Fig. 1. *Anabrus longipes* Caud.; first instar nymph, much enlarged.

First instar. (one day after hatching): Head arched above, the vertex projecting forward to approximately the anterior extremity of the first antennal segment; eyes small, rounded, somewhat oblique; antennae with about 65 segments, reaching to the tip of the hind femora, first segment much inflated, semi-pear shaped, flattened, second segment of normal shape, sub-cylindric, segments 3-6 gradually becoming shorter, the rest sub-equal, about as wide as long. Pronotum with the hind margin of disk convex the lateral lobes very gradually rounded posteriorly, more abruptly so anteriorly, the disk frequently, but not always, divided by a deep sulcus at anterior fifth; meso and metanotum obliquely rounded

*—Contribution from the Division of Field Crop and Garden Insects, Entomological Branch, Dept. of Agriculture, Ottawa.

behind, the wing pads scarcely showing but indicated by a depression at the ultimate place of bending. Color pale grey or greenish, dorsal area with a light median stripe narrowly bordered by black, rest of dorsal surface marked with brown; lateral lobes black, shining, bordered posteriorly by a pale yellow area extending obliquely almost to the middle of the ventral margin. (See fig. 1.). Length of antennae 8 mm., pronotum 1.5 mm., hind femora 5.5 mm., hind tibiae 4.5 mm.

Second instar. Antennae with approximately 90 segments, the tip reaching to about the middle of the hind tibiae, vertex projecting as before; pronotum not cut by a sulcus, the posterior margin of disk obtusely angulate. Color as in first stage. Length of antennae 11-12 mm., pronotum 2 mm., hind femora 6.5 mm., hind tibiae 6 mm.

Third instar. Much as before in color and general structure; ovipositor extending to tip of abdomen. Length of antennae 18 mm., pronotum 4 mm., hind femora 9 mm., hind tibiae 8.5 mm.

Fourth instar. Head as before excepting that the vertex is less projecting and it now meets the front in a straight line though separated from it by a wedged-shaped sulcus; antennae with about 124 segments; wing pads indicated as short attachments to the lateral lobes but not projecting backwards; ovipositor extending slightly beyond abdomen. Color somewhat paler than before, more suffused with brown, the black areas being replaced with olive. Length of antennae 19 mm., pronotum 6.5 mm., hind femora 10 mm., hind tibiae 9 mm.

Fifth instar. Head as before; pronotum extending half way across the metanotum, wing pads indicated by poorly developed folds; ovipositor upturned, plainly visible from above. There is not much variation in color: some individuals are dark, others pea green. The pattern closely resembles that of the adult. Length of antennae 25 mm., pronotum 7.5 mm., hind femora 14 mm., hind tibiae 13.5 mm.

Sixth instar. Antennae with approximately 125 segments, longer in the male than in the female; wing-pads upturned but still very short, hidden by the pronotum, those on the metanotum, when the pronotum is bent forward, showing as reddish projections. Length of antennae 26-30 mm., pronotum 8 mm., hind femora 17 mm., hind tibiae 16.5 mm., ovipositor 5.5 mm.

Seventh instar. The insect now closely resembles the adult. Length of antennae 30-35 mm., pronotum 9.5 mm., hind femora 21 mm., hind tibiae 18 mm., ovipositor 13 mm. The insect is fully developed after the next moult, thus undergoing seven moults and taking approximately 43 days to attain maturity.

HABITS

When about to moult the nymph of *Anabrus longipes* climbs some convenient object such as a bent-over weed or grass stem and attaching itself firmly by the hind, and occasionally by the middle tarsi, hangs head downwards until such time as the muscular contortions free it from its old skin. The moulting process requires from 15 to 50 minutes. It is accompanied by considerable danger to the insect. One of these dangers is due to the long legs becoming much bent before they are finally freed and in such a case, if moulting is abnormally prolonged, they are apt to become hardened and thus permanently crippled. Several individuals in the cages suffered in this way. A more vital danger exists when

others are present in the immediate vicinity. These attack their moulting companions readily and literally eat them alive.

The process of moulting is always an interesting one to watch and the spectacle of a sword-like ovipositor 13 mm., long being drawn from a sheath 5.5 mm. long seems worthy of a conjurer. Yet a similar feat is performed in withdrawing the antennae and legs as all these appendages have assumed their full dimensions before they are free from their old and less extended skins. After getting clear of its old skin the insect turns around as if to view it and after remaining in this position twenty minutes proceeds to devour the cast off garment.

Unlike the short horned grasshoppers (Locustidae) the newly moulted *Anabrus* is almost fully colored at the time it leaves the old skin. It also requires a much shorter period of rest before feeding activities are recommenced.

The nymphs of *Anabrus longipes* are active at a considerably lower temperature than are those of the Locustidae and their eggs require less heat for incubation. The species is, therefore, an early one to emerge in spring time.

In feeding, the first instar nymphs are apparently dependent upon certain plants and unless these are present they promptly die of starvation. In the first attempt to rear the insect we failed utterly because the only available food was growing wheat, bran and fruit, and they would eat none of these. On the second attempt to rear them the available plants were more varied and after numerous failures one was found that proved eminently palatable. This was a member of the Primulaceae, namely *Androsace occidentalis*, a plant which grows freely on sandy soil and is one of the first in spring time to develop both leaves and flowers. As this plant, with two others of the genus, occurs in British Columbia, it is highly probable that they constitute at least one of the sources of food supply. The insect has also been reported by Mr. Buckell as feeding upon wild geraniums and later in its life upon various garden plants including onions. It was, indeed, a pest of considerable importance in 1926.

After the first instar these grasshoppers became less exclusive in their diet and in the third, fourth and fifth instars they freely ate the leaves of grain and grasses. Several members of the Cruciferae were found to attract them, more particularly pepper grass (*Lepidium*) and tumbling mustard (*Sisymbrium*), the latter being specially relished during the later stages of growth and throughout the adult life. Indeed this preference for mustards suggested a bran bait to which table mustard was added as an attractant, which proved so palatable that it was afterwards used almost exclusively to feed the individuals in our cages. Another bait which proved attractive was made by mixing chopped meat or blood, with bran; this was based upon the cannibalistic habits of the insects and their known liking for an animal diet.

The cannibalistic tendency of this species resulted in several losses among the specimens we were rearing. In fact individuals are known to have repeatedly returned to attack a moulting companion and it required the utmost vigilance to keep them away. Adults appear to be less ferocious than the nymphs but even they are wary of another's approach and the slightest touch from an antenna causes them to jump.

While many dead insects are eaten by this species we have observed no efforts to capture them alive unless, as it sometimes happens, the victims are suf-

ficiently maimed to offer little or no resistance. Pairs in our cages lived quite amiably side by side and carried on their daily functions without friction.

It might be supposed that a large insect like *Anabrus longipes* would have numerous enemies and that it would fall a speedy victim to various birds. This is doubtless the case. Nevertheless, these insects have a color pattern that enables them to hide very effectively, while their remarkable agility when disturbed and their habit of leaping in a zigzag course, doubtless enables them to escape many such predators.

Under caged conditions *Anabrus longipes* began to show sexual maturity exactly a week after the final moult, the event being evidenced by a musical performance. Six days later a pair were observed mating. Sunshine has a marked influence on the activities of the insects at this time. Its stimulating effects are particularly noticeable during the early morning at which time most of the courting takes place.

The music is to the human ear a prolonged unmusical trill not unlike the loud, rapid, ticking of a watch. Its qualities are doubtless more attractive to the ear of the female insect and there is no doubt that it is a factor of importance in guiding the female to the musician.

The active courtship is largely confined to the male. When alone his efforts are largely musical but when a female draws near he is all attention. He eagerly follows her around, at one moment stroking her with his long antennae and, at another, playing his music with ardour. Should she respond to his approaches then courtship is brief, otherwise it may be indefinitely prolonged. Reciprocal attraction is demonstrated as the pair draw nearer together, by the crossing and recrossing of the antennae. The male then turns away from the female and she slowly approaches him. His antennae are now held over his back and he continues to stroke her with them as she draws nearer. She finally mounts upon his back, bends her ovipositor down in a groove between the male cerci and practically forces copulation. The whole performance lasts less than two minutes and as the pair separate the female is seen to be carrying a large semi-bilobed white sac (spermatophora). This she retains for several hours and ultimately devours the portion remaining at the end of that time. Mating usually takes place three or four times during the preoviposition period and it recommences shortly after each lot of eggs has been deposited.

The method of egg laying is very similar to that of the larger field crickets (*Gryllus*). When ready for ovipositing the female *Anabrus* moves actively about in search of a suitable situation in which to place her eggs and having eventually found one she raises her abdomen so that she can bend her ovipositor perpendicularly beneath it. She next stabs the soil in various places as if testing its fitness, until finding a place of suitable texture she quickly works her ovipositor into it. An egg is then deposited and within a few minutes another situation is sought and a second egg laid. Thus the process of egg laying may continue for many hours until the entire clutch of eggs, amounting to 50 or more, is deposited. After egg-laying there is a period of rest intermixed with eating and mating. Ten days later another lot of eggs may be placed in the soil and later on still others. Altogether one female, in the 93 days of her adult life, laid an aggregate of 216 eggs, another individual, dying 14 days sooner, deposited 119 eggs and a third, 107.

All the females were dead by September 15 but a single male survived for nearly a month longer and continued to play his music to within a few days of the time of his death.

NEW NON-GALL MAKING ITONIDIDAE (DIPTERA).

BY E. P. FELT,

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The non-gallmaking Itonididae of America were comparatively unknown until recent years and although a considerable number of species have been described, it is probable that only a relatively small proportion have yet been characterized. This addition to the list is particularly desirable, since the collections are from a relatively unknown area, a section capable of producing good sized midges, as evidenced by the dimensions of *Monardia canadensis* described below.

Lestremia garretti n. sp.

This specimen was taken by Mr. C. Garrett, August 18, 1922 on Wilson Creek, Michel, B. C., altitude 5000 feet.

Female.—Length 2 mm. Antennae $\frac{3}{4}$ the length of the body, sparsely haired, dark brown, 11 segments, the fifth with a stem about $\frac{1}{3}$ the length of the cylindrical basal enlargement, the latter with a length about 3 times its diameter, terminal segment produced, with a length 4 times its diameter, tapering to a rather obtuse apex. Palpi, first segment narrowly pyriform, the second with a length $\frac{1}{4}$ greater than the first, the third more slender and twice as long as the second, the fourth more slender and a little shorter than the third; mesonotum shiny, dark brown, the submedian lines sparsely haired, scutellum reddish-brown, post-scutellum darker, abdomen dark brown, sparsely haired; halteres yellowish basally, fuscous apically, legs dark reddish-brown, claws strongly curved, the pulvilli shorter than the claws; ovipositor short, the basal portion with a length about $\frac{3}{4}$ its width, the distal portion suborbicular, with rather numerous, coarse setae.

Type, Cecid. 1834, N. Y. State Museum.

Lestremia occidentalis n. sp.

The specimen was taken by Mr. C. Garrett, August 22, 1920 at Cranbrook, B. C.

Female. Length 2.5 mm. Antennae about half the length of the body, rather thickly haired, dark brown, 11 segments, the fifth with a stem $\frac{1}{3}$ the length of the cylindrical basal enlargement, the latter with a length 3 times its diameter, distinctly swollen basally and slightly so apically, terminal segment produced, with a length over 4 times its diameter. Palpi, first segment narrowly oval, with a length over twice its diameter, the second more slender, nearly twice the length of the first, the third more slender and about twice the length of the third and the fourth nearly as long as the third, somewhat dilated apically; mesonotum fuscous brownish, the submedian lines rather thickly haired, scutellum a little darker, postscutellum and abdomen dark brown, the latter sparsely haired; ovipositor fuscous yellowish, short, the basal portion with a width about equal to its length, the distal part oval; halteres fuscous yellowish, legs a variable fuscous brown, the tarsal segments dark brown, claws moderately stout, strongly curved, the pulvilli as long as the claws.

Type, Cecid. 1832, N. Y. State Museum.

***Neocatocha cranbrookii* n. sp.**

A female was taken by Mr. C. Garrett at Cranbrook, B. C., October 14, 1922.

Female. Length 1.5 mm. Antennae hardly extending to the base of the abdomen, sparsely haired, dark brown, 8 segments, the fifth broadly oblate, with a length about $\frac{3}{4}$ its diameter, terminal segment with a length 3 times its major diameter, tapering gradually, with slight constrictions at the basal and distal third to a somewhat obtuse apex. Palpi, first segment with a length 3 times its diameter, somewhat dilated apically, the second and third each about as long as the first, the fourth $\frac{1}{2}$ longer and more slender; mesonotum dull brownish black, scutellum dark reddish, postscutellum dark yellowish, abdomen dark brown, wings with the third vein uniting with the anterior margin at the distal third; halteres dark reddish basally, fuscous apically, legs a nearly uniform dark brown, ovipositor short, basal portion of the lobe with a length fully twice its width, the distal portion narrowly oval, with a length nearly twice its width.

Type, Cecid. 1835, N. Y. State Museum.

***Cordylomyia fulva* n. sp.**

A midge was taken by Mr. C. Garrett, May 19, 1920 at Cranbrook, B. C.

Female. Length 1.5 mm. Antennae extending to the base of the abdomen, sparsely haired, fuscous yellowish, 12 segments, the fifth sub sessile, cylindrical, with a length $\frac{1}{4}$ greater than its diameter and with subapical, circular, sensory pits; terminal segment produced, subcylindrical, with a length 3 times its diameter, distinctly constricted at the distal third, obtuse apically. Palpi, first segment broadly oval, with a length $\frac{1}{2}$ greater than the width, the second $\frac{1}{2}$ the length of the first, subcylindrical, the third as long as the second, somewhat dilated, the fourth $\frac{1}{2}$ longer than the second, with a length about 3 times its diameter; mesonotum brownish-black, scutellum dark brown, postscutellum fuscous yellowish, abdomen yellowish-brown, halteres fuscous yellowish, legs a nearly uniform fuscous straw, claws slender, strongly curved, the pulvilli as long as the claws; ovipositor short, the basal portion subquadrate, with a length scarcely equal to the width, the distal part broadly oval.

Type, Cecid. 1839, N. Y. State Museum.

***Cordylomyia praelonga* n. sp.**

Both sexes, apparently of this species, were taken by Mr. C. Garrett, October 14, 1922 at Cranbrook, B. C.

Male. Length 1.5 mm. Antennae nearly as long as the body, thickly haired, dark brown, 14 segments, the fifth with a stem twice the length of the subpyriform basal enlargement, the latter with a length $\frac{1}{4}$ greater than its diameter and near the middle a closely set whorl of divergent setae, apically an irregular whorl of long setae extending mostly parallel with the axis of the segment: terminal segment reduced, subglobose. Palpi, first segment subquadrate, with a length over twice its diameter, the second more slender, as long as the first, the third a little longer than the second, the fourth twice as long as the third, somewhat dilated; mesonotum shining black, the submedian lines sparsely haired, scutellum dark reddish, postscutellum fuscous, abdomen dark brown. Wings, third vein uniting with the margin at the apex, halteres fuscous yellowish, legs mostly fuscous yellowish,

claws rather stout, strongly curved, the pulvilli longer than the claws. Genitalia; basal clasp segment rather long, stout, terminal clasp segment obpyriform, with a length twice the major diameter. Other structures indistinct in the preparation.

Female. Length 1.5 mm. Antennae extending to the base of the abdomen, rather thickly haired, fuscous yellowish, 11 subcylindrical, sessile segments, the fifth with a length $\frac{1}{2}$ greater than its diameter, with subapical, sensory pits; terminal segment somewhat produced, with a length twice its diameter. Palpi, first segment subquadrate, the second slender, as long as the first, the third a little longer than the second and the fourth $\frac{1}{2}$ longer than the second, somewhat dilated; mesonotum brownish-black, scutellum dark brown, abdomen dark brown, halteres fuscous yellowish basally, somewhat fuscous apically, legs mostly dark straw, tarsal segments blackish, claws rather heavy, strongly curved, the pulvilli as long as the claws; ovipositor short, basal portion of the lobe subquadrate, with a length about $\frac{3}{4}$ the width, terminal portion orbicular, Cecid. 1842. The association of the female is provisional.

Type, Cecid. 1843, N. Y. State Museum.

***Cordylomyia scutellata* n. sp.**

The adult was collected by Mr. C. Garrett, October 23, 1921 at Cranbrook, B. C.

Female. Length 2.25 mm. Antennae extending to the base of the abdomen, rather thickly haired, dark brown, 11 subsessile, subcylindrical segments, the fifth with a length $\frac{1}{2}$ greater than its diameter and subapically oval, sensory pits; terminal segment somewhat produced, with a length nearly 3 times its diameter and tapering slightly to an obtusely rounded apex. Palpi, first segment somewhat enlarged, with a length about twice its diameter, the second more slender, a little longer than the first, the third a little longer than the second and the fourth nearly twice the length of the second, somewhat dilated; mesonotum brownish-black, the submedian lines sparsely haired, scutellum fuscous yellowish, postscutellum and abdomen dark brown, the latter sparsely haired. Wings, subcosta uniting with the anterior margin at the basal half, halteres whitish transparent, legs mostly dark straw, the tarsi blackish, claws slender, rather strongly curved, the pulvilli as long as the claws; ovipositor short, basal portion of the terminal lobe subquadrate, with a length nearly equal to the major diameter, terminal portion orbicular.

Type, Cecid. 1841, N. Y. State Museum.

***Monardia canadensis* n. sp.**

This giant midge was collected by C. Garrett on the north fork of Wilson Creek, Michel, B. C., altitude 5200 feet.

Female. Length 5 mm. Antennae extending to the third abdominal segment, rather thickly haired, dark brown, 27 segments, the fifth with a stem nearly as long as the somewhat transverse basal enlargement, the latter with a length about $\frac{3}{4}$ its diameter, terminal segment somewhat produced, compound. Palpi, first segment irregularly cuboid, second rather slender, with a length over 3 times its diameter, the third more slender, $\frac{1}{4}$ longer and the fourth more slender than the third and $\frac{1}{4}$ longer; mesonotum a dark slaty brown, the submedian lines sparsely haired, scutellum slaty brown, postscutellum fuscous yellowish, abdomen dark brown, rather sparsely clothed with hairs, wings subfuscous, there being a distinct shading along the costa and the third vein; halteres yellowish, legs a nearly

uniform brownish-straw, claws rather long, strongly curved, finely pectinate basally, slightly angled at the distal third, the terminal portion slender; pulvilli rudimentary, ovipositor short, basal portion with a length a little greater than the diameter, the terminal lobes roundly triangular, with a length $\frac{1}{4}$ greater than the width, sparsely setose.

Type, Cecid. 1838, N. Y. State Museum.

***Porricondyla minor* n. sp.**

This female, remarkable because of the reduced number of antennal segments, was taken August 21, 1920 by Mr. C. Garrett at Cranbrook, B. C.

Female. Length 2 mm. Antennae $\frac{3}{4}$ the length of the body, sparsely haired, dark brown, 11 segments, the fifth with a stem $\frac{1}{2}$ the length of the sub-cylindrical basal enlargement, the latter with a length 3 times its diameter and with rather thin sub-basal and subapical whorls of long setae; terminal segment with a length 5 times its diameter and apically a short knob-like appendage. Palpi, first segment with a length about 3 times its diameter, the second more than twice the length of the first, the third a little longer than the second, somewhat dilated apically, and the fourth a little longer than the third, more slender; mesonotum reddish-brown, the submedian lines indistinctly yellowish, scutellum and post-scutellum probably yellowish, abdomen yellowish-brown, sparsely haired, the terminal lobes of the short ovipositor with a length 4 times the width and thickly setose, halteres yellowish transparent, coxae and femora basally pale yellowish, the remainder of the legs mostly dark straw.

Type, Cecid. 1848, N. Y. State Museum.

SOME NEW CORIXIDAE FROM THE NORTH

BY H. B. HUNGERFORD,

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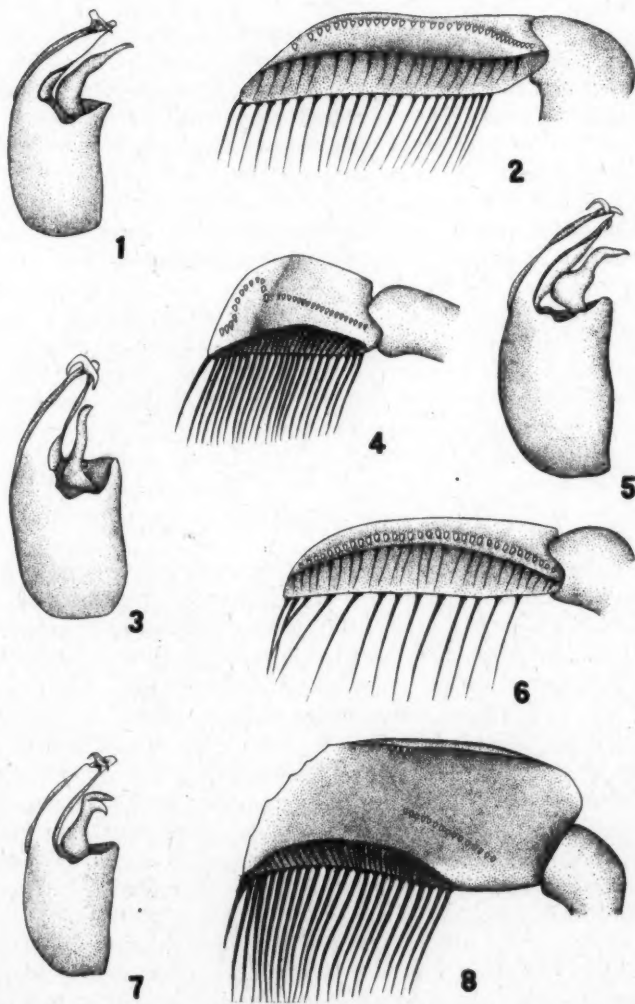
The following five species of Corixidae are new and interesting additions to our fauna. The unique *A. fallenoidea* from Selkirk, Manitoba, Canada is very near *A. falleni* (Fieb.), a most common species in Poland, and *A. glossata* Lundblad described from Sweden. Another interesting species described below possesses characters that place it provisionally in the genus *Glaenocorixa*—the first representative of that genus in America.

***Arctocorixa bifida* n. sp.**

Size: Length 8.3 mm; width across head 2.5 mm.

Color: Face and limbs yellow. Lateral margins of meso- and metathorax yellow, remainder of venter more or less black. Pronotum crossed by about a dozen brown bands that are narrower than the yellow, the middle ones somewhat broken. Hemelytra quite uniformly mottled, figures arranged faintly into five longitudinal series on corium.

Structural characteristics: Head of male bluntly conical in front as viewed from above, interocular space at synthlipsis as wide as an eye. Frontal depression of face long and overhung above by a projecting point of the vertex. Slight carina on anterior fourth of pronotum. Surface of prothorax and hemelytra shining, rastrations faint. Metaxyphus slender. Front tibia of male carinate. Male pala broad, palar pegs in two rows, the basal row of about 16 pegs that are small and closely crowded at base of pala but



Arctocorixa bifida n. sp. Fig. 7. Genital capsule of male. *Arctocorixa conocephala* n. sp. Fig. 1. Genital capsule of male. Fig. 2. Pala of male. *Arctocorixa fallenoidea* n. sp. Fig. 8. Pala of male. *Glaenocorixa hybrida* n. sp. Fig. 3. Genital capsule of male. Fig. 6. Pala of male. *Arctocorixa wileyi* n. sp. Fig. 4. Pala of male. Fig. 5. Genital capsule of male.

having the last six large and widely spaced, the upper row of ten slender, closely placed pegs upon the inturned apical margin of the pala. Pala not thickened, apical half bent forward. Strigil large, transverse, 13 striae, outer ones broken and irregular. Right side of dorsum of seventh abdominal segment roughened. Genital capsule as shown in figure 7.

Described from specimens received from Washington University bearing the label Alberta, Lost Lake, Canada.

Holotype in University of Kansas collection.

***Arctocorixa conocephala* n. sp.**

Size: Length 7.6 mm.; width across eyes 2.1 mm.

Color: Head, limbs, and sternum pale yellow, the basal abdominal segments dark with pale margins. Thorax crossed by seven pale lines, all entire and even except the fourth which is split into two equal bands in the middle, base of clavus crossed by somewhat transverse bands, remainder by undulate more or less broken pale marks. Pale marks of corium irregular short and undulate, faintly to plainly arranged in four longitudinal series. Distal angle of corium margined by pale line. Membrane dark, mottled with pale figures.

Structural characteristics: Head of male strongly conical, face long and flat, surface of pronotum, clavus and basal part of corium rastrate. Metaxyphus relatively short, lateral lobes of prothorax long. Front femora of males somewhat incrassate and pala long and slender, somewhat longitudinally carinate on back side (see figure 2). Strigil small, slightly transverse, 5 irregular striae. Genital capsule of male as shown in Fig. 1.

Described from a male taken by the writer on Mackinac Island, Michigan State Park which is the *Holotype* and other males from Minnesota, Dakota and Manitoba, Canada.

Holotype in Kansas University Museum and paratypes in the Canadian National Collection, Ottawa, Canada, and in the University of Minnesota collection.

Note: This species is readily distinguished from all others by the conical shape of the front part of the head in the male as seen from above and by the fact that it lacks the median carina on the pronotum.

***Arctocorixa fallenoidea* n. sp.**

Size: Length 8 mm.; width across head 2.2 mm.

Color: General color rather pale. Head, limbs, sides of thorax, connexivum and all but basal ventral abdominal segments pale yellow. Pronotum crossed by 9 pale bars broader than the dark ones. Pale markings of hemelytra transverse, slightly undulate, mostly furcate at hemelytral suture and somewhat broken on corium but distinctly transverse. Membrane marked with transverse wavy pale lines.

Structural characteristics: Face of male long, slightly flattened; slight carina traversing first three pale bars of pronotum. Rear margin of pronotum distinctly angulate, metaxyphus short, bluntly rounded, appearing notched at apex and convexly raised at base. Lateral lobe of prothorax long, asymmetrically rounded at end. Pala of male very broad and plate-like (see figure 8). Strigil very small, striae perhaps three but indistinct.

Holotype, a male taken by J. B. Wallis, 10-VI, 1911. Selkirk, Manitoba, Canada.

Comparative notes: This specimen was quite a surprise to me and I supposed it was *A. falleni* (Fieb.) until I compared it with material from Russia.

A splendid paper by Dr. O. Lunblad entitled "Studien über schwedische Corixiden III Zur Kenntnis der beiden Arten *Arctocorisa glossata* n. sp. and *A. falleni* (Fieb.)" appeared in "Entomologisk Tidskrift" pp. 193-200 (1925). From the careful descriptions and drawings in this paper I am able to say that the structure of the dorsal part of the seventh abdominal segment is much more like *A. glossata* Lundblad than like *A. falleni* (Fieb.). Indeed the slender lobe on the caudal margin is more angular and more sharply pointed than his figure 23 on table VIII. The pala has the arrangement of the pegs more like his *A. falleni* (Fieb.). Dr. T. Jaczewski in his "Revision of the Polish Corixidae" 1924 (Annales Zoologici Musei Polonici Historiae Naturalis, Tom III) considers *A. falleni* (Fieb.) a quite variable species and figures two types of pala. My species has the general shape of his figure 39 on page 43, the pegs however are different. My species is closely related to *A. falleni* (Fieb.) and *A. glossata* Lundblad.

***Glaenocorixa hybrida* n. sp.**

Size: Length 8 mm.; width across eyes 2.6 mm.

Color: General color pattern of hemelytra is somewhat like *Cymatia americana* Hussey. The pronotum crossed by eight pale bands, the median ones of which are split.

Structural characteristics: Eyes prominent and remote from rear margin of head which is produced to distinct angle in the middle. Face short, concave in both sexes and covered with long light hairs. Beak with transverse ridge at base. Lateral margins of pronotum carinate, limiting the pigmented field. Low anterior median carina traversing first three or four pale bars of pronotum. Metaxyphus acutely pointed. Front pala slender in both sexes but broader than in *Cymatia*. Male pala as shown in figure 6. Strigil large and round. The male genital capsule as shown in Fig. 3.

Holotype male and *allotype* female taken by me in Minnesota.

Comparative notes: This unique species is placed in the genus *Glaenocorixa*. The pala is quite unlike that of *Glaenocorixa cavifrons* but other characteristics relate it to this species. The character of the pala cannot be generic in this case and should be omitted from future descriptions of the genus.

***Arctocorixa wileyi* n. sp.**

Size: Length 6.8 mm.; width across eyes 2.1 mm.

Color: Head, limbs and pale factor of color pattern pale yellow. Pronotum crossed by twelve to fourteen thin brown lines that are discontinuous, interlapping and anastomosing. The hemelytra mottled, pattern on clavus more or less transverse, pale color dominant throughout.

Structural characteristics: Facial depression of male large, ovoid, extending to margin of the eye on the side and vertex above. Vertex prominent with low median longitudinal carina. Median carina on anterior portion of pronotum. Surface of pronotum and hemelytra shining, faintly rastroate. Lateral lobes of prothorax fairly slender, front tibia strongly carinate, pala of male broad, basal portion thick, distal part thin and bent sharply inward. Pegs as shown in figure 4. Strigil minute, slightly trans-

verse of 4 striae and plainly petiolate. Genital capsule as in figure 5. Described from a male taken in Wasatch Mts., Utah by Mrs. Grace Wiley July 27th, 1921.

Comparative notes: This species resembles superficially several described species but is to be recognized by arrangement of the paler pegs and right clasper of the male genital capsule. This species will undoubtedly be taken farther north.

NEW AND NOTEWORTHY HISTERIDAE FROM ALBERTA* (COLEOPTERA):

BY MELVILLE H. HATCH,

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Through the kindness of Mr. F. S. Carr of Medicine Hat, Alta., the author has had the privilege of examining the specimens of Histeridae from that province that are reported on below. All the localities are Albertan and the specimens were all collected by Mr. Carr, who informs me that it is his intention to deposit the types of the new forms in the Canadian National Collection at Ottawa. The classification and sequence of genera is that adopted by Heinrich Bickhardt in fascicule 166 of the *Genera Insectorum* (1916-17).

SUBFAMILY SAPRININAE

Saprinus oregonensis distinguendus Mars. Medicine Hat, July 1, 1920.

Saprinus carri n. sp.

Length (apex of thorax to apex of suture) 3.5 mm., width 2.3 mm. Throughout shining black, densely punctate except midventral portions which are nearly smooth. Supraocular stria distinct, not present on front. Pronotum narrowly margined cephalad and laterad, slightly more densely and more finely punctate at sides than on disc. Elytra finely punctate only in immediate vicinity of scutellum, becoming very densely and subacutely punctate towards sides and apex. Marginal and outer subhumeral striae entire, distant, approaching each other at apex whence the subhumeral extends about four-fifths the distance to suture. Inner subhumeral apical, not connected with oblique humeral which is basal. First, second, third, fourth and sutural striae present, not attaining base of elytra; first to fourth subequal, extending about two-thirds the distance to apex; sutural extending about four-fifths the distance to apex and joined with fourth dorsal at base. Pygidium without marginal sulcus and more densely punctate than propygidium. Prosternum moderately convex with divergent ascending striae terminating cephalad in foveae. Lateral portions of meso- and metathorax and abdomen below densely subacutely punctate. Protibia about octodentate (through malformation the third tooth of the left protibia of the type is obsolete); meso- and metatibiae spinose.

Holotype—Medicine Hat, Alta., Apr. 23, 1923, F. S. Carr collector, deposited in Canadian National Collection at Ottawa.

Paratypes—Medicine Hat, Alta., Apr. 7, 1923 and May 3, 1924, F. S. Carr collector; Florissant, Colo., Aug., Wickham (last specimen in collection of author).

This form is separated in the following key from the other forms allied to *Saprinus insertus* Lec. They are closely allied, distributed from Colorado and Alberta to California and Oregon, and the present classification must be consid-

*—Contribution from the Zoological Laboratory of the University of Michigan.

ered tentative until more extensive series are available.

KEY TO FORMS ALLIED TO *SAPRINUS INSERTUS* LEC.

- A¹ Pronotum more coarsely and densely punctate near the sides; legs rufescent; anterior tibia with about seven long serriform teeth; Calif *lentus* Csy.
- A² Pronotum subequally punctate throughout; legs black.
- B¹ Sutural stria continuous towards base.
- C¹ Anterior tibia with five or six low broad serrulations; marginal and outer subhumeral striae distinct.
- D¹ Elytral punctures fine at base, becoming coarser at about basal third; marginal and outer subhumeral striae close together; marginal stria continuous along apex attaining suture; oblique humeral and inner subhumeral continuous; Calif *opacellus* Csy.
- D² Elytral punctures fine only in immediate vicinity of scutellum, elsewhere coarse and dense, subaciculate towards apex; marginal and outer subhumeral distant; outer subhumeral continuous along apex not or scarcely attaining suture; oblique humeral and inner subhumeral separate; Alta., Colo *carri* n. sp.
- C² Anterior tibia with a close-set series of long slender erect denticles; marginal and outer subhumeral striae confluent; Calif., Ore . . *insertus* Lec.
- B² Sutural stria obsolete basally; punctures strong and dense throughout, more or less confluent caudad; Wyom. *cribrum* Csy.

Saprinus fimbriatus desertorum Mars. Medicine Hat, July 13, 1924.

SUBFAMILY DENDROPHILINAE

Isomalus bistriatus Er. Edmonton, Aug. 27, 1914.

SUBFAMILY HISTERINAE

Tribe Platysomini

Platysoma (s. str.) *depressum* Lec. Edmonton, Sep. 4, 1921.

Platysoma (*Cylistosoma*) *coarctatum* Lec. Edmonton, Aug. 22, 1917.

Platysoma (*Cylistosoma*) *punctigerum* Lec. Edmonton, Oct. 1922.

Tribe Histerini

Psiloscelis carri n. sp.

Length (apex of thorax to apex of suture) 6 mm., width 4.8 mm. Throughout black, opaque, punctate, the punctures being foveolate in many places. Front margined laterad and cephalad, frontal suture transverse. Front densely punctate, the punctures foveolate towards base. Outer thoracic entire along side, hooked in front and not continuous along apex of pronotum. Inner thoracic stria continuous along lateral and apical margins of pronotum but narrowly interrupted along mid-dorsal line. Pronotum densely punctate, towards the sides fine punctures are intermingled with large foveolate ones; distinct scutellar and pair of discal impressions present. Elytra punctate with fine punctures throughout and with large foveolate punctures except along suture. Marginal and outer subhumeral striae confluent for basal third, suddenly separated at middle, gradually approximate towards apex, the marginal obsolete throughout apical sixth. A moderately prom-

inent but not carinate ridge or fold between outer subhumeral and oblique humeral. Oblique humeral basal, crescent shaped. Inner subhumeral obsolete. First, second and third dorsals entire. Fourth and fifth, somewhat broken at base (right fourth dorsal abbreviated at apical fifth). Sutural obsolete at basal third. Propygidium and pygidium punctulate and coarsely foveolate. Prosternum margined behind. Protibia sexadentate. Meso- and metatibia spinose, the latter with a row of about six seta-bearing tubercles on its ventral surface immediately behind the cephalic margin and with traces of a similar structure on the mesotibia.

Holotype—Happy Valley, Alta., May 22, 1926, flying, F. S. Carr collector. Deposited in Canadian National Collection at Ottawa.

Psiloscelis corrosa Csy. Buffalo, May 10, 1923.

The following key to the species of *Psiloscelis* will serve to illustrate the position of the new species. Smith (Insects of New Jersey, 1909, p. 268) records *harrisii* Lec. from ants nests, and it is possible that the entire genus is myrmecophilous. Specimens are scarce. The genus is confined to North America; to the Atlantic states from Georgia to New York and Massachusetts and in the west to Nebraska, Wyoming, Alberta, and Vancouver Island.

KEY TO SPECIES OF PSILOSCELIS MARS.

A¹ Prosternum margined behind.

B¹ Dorsal surface opaque; much less than twice as long as broad.

C¹ Without row of tubercles on ventral surface of metatibia immediately behind cephalic margin; pronotum without or with very faint impressions; Atlantic states.

D¹ Narrower; frontal stria transverse; length 6.5 mm.; Mass. to Ga. *harrisii* Lec.

D² Broader; frontal stria angulate; length 6.7 mm., N. Y. *incurva* Csy.

C² With row of about six seta-bearing tubercles on ventral surface of metatibia immediately behind cephalic margin; pronotum with a scutellar and a pair of discal impressions; length 6 mm.; Alta. *carri* n. sp.

B² Dorsal surface shining; nearly twice as long as broad; length 4.3 mm.; Wyom., Alta. *corrosa* Csy.

A² Prosternum not margined behind.

B¹ Dorsal surface opaque; length 6.5 mm.; Mass. *perpunctata* Lec.

B² Dorsal surface shining.

C¹ Length 4.2 to 4.5 mm.; Mass *blanchardi* Csy (*repletus* Lec. nom. nud.)

C² Length 6 to 7.2 mm.; western states.

D¹ Subhumeral stria entire or apical, humeral obsolete or short; length 6 mm.; Nebr., Vanc. *subopacus* Lec.

D² Subhumeral basal; humeral obsolete; length 7 mm.; Wyom. *millepora* Csy.

Hister (Spilodiscus) solaris Carn. Medicine Hat: Apr. 20, May 24, 1923; Sept. 6, 1924; May 15, 1925. Alternative 2 of Casey's key to the subgenus *Spilodiscus* (Mem. Col. 7 (1920); 206-214) is misleading, since *solaris* Carn. and *semiruber* Csy. have the surface of the pronotum between the lateral striae anteriorly with ruguliform lines. The species so characterized may be separated as follows:

A¹ Rufous area of elytra narrow, not attaining lateral margins; femora rufous; length 6.8—7.3 mm.; Atlantic states: Key West, Fla. to Mass. (?) "Cal." *arcuatus* Say.

A² Rufous area broader, attaining lateral margins; western North America.

B¹ Femora black.

C¹ Sutural stria present apically; length 4.8-6 mm.; Calif. ... *sellatus* Lec.

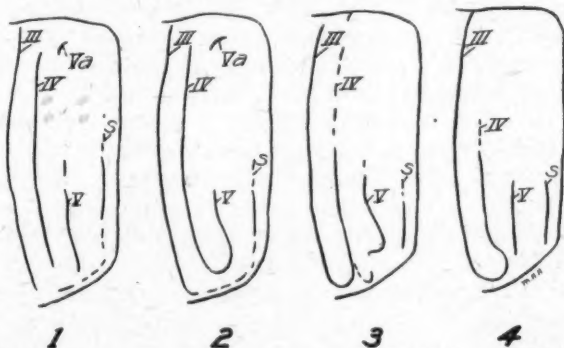
C² Sutural stria absent; length 6.3 mm.; Utah *semiruber* Csy.

B² Femora rufous; length 5-5.8 mm.; Nebr., Colo., Man., Alta. *solaris* Carn.

The rugulae are very nearly but not quite absent from one of the specimens of *solaris* Carn. The species of *Spilodiscus* are confined to North America, one species occurring on the Atlantic sea-board and the rest westward from Manitoba and Oklahoma and northward from Mexico (*flohri* Lewis and *patagiatus* Lewis) to Manitoba and southern Alberta.

Hister (s. str.) harrisii Kby. Medicine Hat, Apr. 28, 1923.

The two new aberrations of *Hister interruptus* Beauv. described below represent the extreme stages of the process of loss and reduction of striae in what I interpret as a single species. *Immunis* Er. must be regarded as another member of the same series. These variants may be distinguished by the following key and the figures of the third, fourth, fifth and sutural striae. The conformations of the apical portions of these striae are not considered.



Portions of elytra of: (1) *Hister interruptus* (typical), (2) *H. interruptus* ab. *immunis* Er., (3) *H. interruptus* ab. *albertensis* nov., (4) *H. interruptus* ab. *carri* nov. s, sutural stria; III, third dorsal stria; IV, fourth dorsal stria; V, fifth dorsal stria; V a, appendix to fifth dorsal stria.

Key to aberrations of *Hister (s. str.) interruptus* Beauv.

A¹ Fourth dorsal stria nearly attaining base, entire; basal appendix of fifth present.

B¹ Sutural stria extending in front of middle; Conn. to Ind.; (fig. 1). typical *interruptus* Beauv.

B² Sutural stria not extending in front of middle; Conn. to Iowa, (?) Cal.; (fig. 2) ab. *immunis* Er.

A² Fourth dorsal stria broken or obsolete basally; basal appendix of fifth absent; sutural stria not extending in front of middle.

B¹ Fourth dorsal stria broken basally; (fig. 3); type: Medicine Hat, Alta., May 20, 1923, F. S. Carr collector, deposited in Canadian National Collection at Ottawa ab. *albertensis* ab. nov.

- B² Fourth dorsal stria obsolete basally; (fig. 4); type: Medicine Hat, Alta., May 3, 1924, F. S. Carr collector, deposited in Canadian National Collection at Ottawa ab. *carri* ab. nov.

The existence of ab. *carri* requires the modification of the definition of Horn's group *merdarius*, since this aberration has only three entire dorsal striae. The group *merdarius* must be distinguished from the group *sexstriatus* entirely on the basis of its outer thoracic stria being distant from the margin. This group is more or less equivalent to Schmidt's group *cadaverinus* (Best. Tab. XIV: 9-13), which includes *terricola* Germ. and *lethierryi* Mars. with only three entire dorsal striae.

Hister (s. str.) *abbreviatus* Fab. Medicine Hat, Sept. 20, 1923.

Hister (s. str.) *furtivus* Lec. Edmonton, July 1, 1921, Sept. 5, 1924.

Hister (*Atholus*) *americanus perplexus* Lec. Medicine Hat, May 11, 1923.

Marganotus guttifer Horn. Medicine Hat, Apr. 13, 1924. This species was previously known from Texas to Nebraska. The only other species of the genus is the European *scaber* Fab.

SUBFAMILY HETAERIINAE, TRIBE HETAERIINI

***Hetaerius carri* n. sp.**

Similar to *H. morsus* Lec. Length 2.1 mm., width 1.6 mm. Throughout reddish brown with pale squamiform hairs, which are best developed on the pronotum, except the posterior lateral areas, and the elytra, finely developed on propygidium, head, and legs, practically absent from pygidium and venter. Discal area of pronotum $2 \frac{2}{3}$ as wide at base as at apex. Subhumeral and first dorsal striae entire; second dorsal extends 68 per cent of distance to base; third dorsal extends three-fifth of distance to base. Punctures of propygidium and pygidium separated by a space more than equal to diameter of the punctures. Prosternum subcylindrical (in Martin's sense). Metafemur three times as long as wide.

Holotype: Medicine Hat, Alta. Apr. 14, 1923. F. S. Carr collector. Deposited in Canadian National Collection at Ottawa.

This species runs to *morsus* Lec. in Martin's key (Ent. News 33:292), but may be distinguished from that species as follows: (1) the range of *morsus* is California; (2) length 2.1 mm. as opposed to 3 mm.; (3) a more sparsely punctate pygidium and propygidium; (4) discal area of pronotum $2 \frac{2}{3}$ as wide at base as at apex as opposed to two times in *morsus*; (5) second dorsal stria shorter: extends 68 per cent of distance to apex as opposed to three fourths; (6) third dorsal longer: extends three fifths of distance to apex as opposed to two thirds.

A PRELIMINARY REVISION OF THE CAMPOPLEGINAE IN THE
CANADIAN NATIONAL COLLECTION, OTTAWA.

BY HENRY L. VIERECK,

Ottawa, Ont.

(Continued from page 260)

***Campoplex (Ameloctonus) disippi* n. sp.**

Related to *C. (A.) oblongus* Viereck.

Female. Length 6 mm.; compared with the original description of *C. (A.) intimus* Vier. this differs as follows. Pedicel brownish at apex in front, flagel black, palpi whitish, hind proximal trochanters blackish and stramineous,

their distal trochanters yellowish and stramineous, hind coxae obscurely reddish near apex beneath, hind femora reddish throughout, extensor surface of fore and mid tibiae mostly yellowish, first and second mid tarsal joints darkened at apex like the following joints are throughout, flexor surface of hind tibiae reddish, the extensor surface blackish, yellowish at base, hind tarsi blackish, their basal joint pale at base, apical half of postpetiole reddish, lateral margin and apical two-thirds of second tergite reddish, an extension of the basal blackish area on each side into the reddish area, third tergite reddish with a black mark at base in the middle, rest of tergites reddish throughout, areola wider than long, narrowly truncate at base, petiolarea finely sculptured; abdomen virtually clavate, the sheath of the ovipositor barely exerted.

Holotype—♀, Toronto, Ont., May 25, 1894, ex *Basilarchia archippus*; No. 1735 in the Canadian National Collection, Ottawa.

Campoplex (Ameloctonus) nigradorsis n. sp.

Related to *C. (A.) oblongus* Viereck.

Female. Length 5 mm.: compared with the original description of *C. (A.) intimus* Vier. this differs as follows. Apical half of scape in front mostly pale, pedicel in front, apically pale, palpi pale stramineous, tubercles dark brownish, fore coxae yellowish, mid coxae stramineous, partly dark, hind coxae brownish at extreme apex, hind proximal trochanters black with an apical yellowish margin, basal half of hind basitarsi mostly yellowish, abdomen black or blackish throughout above, lateral margin of second and third and most of lower half of sides of the following tergites, mostly reddish; areola a little more than twice as long as wide between the costulae, finely, indefinitely reticulate, petiolarea coarsely reticulated.

Holotype—♀, Prince, Edward Co., Ont., July 1, 1896. (Evans); No. 1733 in the Canadian National Collection, Ottawa.

Campoplex (Amelctonus) diversus n. sp.

Related to *C. (A.) nigradorsis* Viereck.

Female. Length, 6 mm.: compared with the original description of *C. (A.) intimus* Vier. this differs as follows. Scape yellowish in front, pedicel in front yellowish at apex, palpi whitish, tubercles dark brownish, fore coxae stramineous, partly darkened, mid coxae black at base, blackish to dark stramineous beyond the base, trochanters stramineous, excepting the hind proximal trochanters which are mostly black, hind coxae black, rest of legs stramineous, hind tarsi mostly brownish, abdomen black, apical third of second tergite yellowish stramineous, third tergite stramineous, blackish at base, fourth tergite stramineous, the following tergites blackish with the apical margin stramineous; areola narrowly truncate at base, nearly as wide as long, transversely lineolate, postpetiole rugulose, almost reticulated; abdomen obliquely truncate, the ovipositor apparently as long as the truncature.

Holotype.—♀, Sudbury, Ont., 1890, No. 101; No. 1734 in the Canadian National Collection, Ottawa.

Campoplex (Ameloctonus) confusus n. sp.

Related to *C. (A.) annulipes* Cresson.

Female. Length 6 mm.; black, antennae black with the apical edge of scape stramineous, mandibles mostly yellow, palpi whitish, tegulae yellowish, fore

coxae black with the apical half mostly yellowish, mid and hind coxae black, trochanters yellowish excepting the hind proximal pair which are black save for a pale apical margin, rest of fore legs stramineous excepting the extensor surface of their tibiae which is partly yellowish, mid femora almost reddish, their tibiae stramineous with the extensor surface mostly yellowish and with the apical third blackish, mid tarsi brownish with the first and second joints mostly pale, hind femora reddish, black at apex, flexor surface of hind tibiae partly reddish, elsewhere the hind tibiae are black near the base and at apex, whitish at base and in the middle, hind tarsi black save for the basal half of the first joint which is whitish; areola a little longer than wide, narrowly truncate at base, transversely lineolate, confluent with the coarsely wrinkled petiolarea; ovipositor not longer than the oblique truncature of the abdomen.

Holotype.—♀, Aylmer, Que., June 3, 1924, (C. H. Curran); No. 1737 in the Canadian National Collection, Ottawa.

Paratype.—♀, Hull, Que., June 11, 1924, (C. H. Curran).

Campoplex (Ameloctonus) pauxillus n. sp.

Related to *C. (A.) confusus* Viereck.

Female. Length 6 mm.; compared with the original description of *C. (A.) confusus* Vier. this differs as follows. Palpi stramineous, mid coxae partly reddish, trochanters yellowish and stramineous, the mid proximal trochanters black at base, rest of fore legs almost entirely reddish stramineous with the base of the extensor surface of their tibiae yellowish, rest of mid legs colored like the fore legs, hind femora reddish throughout, hind tibiae reddish with the extensor surface infuscated, whitish at base, black at apex; areola broadly truncate at base, nearly polished, petiolarea finely wrinkled; abdomen squarely truncate, the ovipositor apparently as long as the truncature.

Holotype.—♀, Transcona, Man., June 25, 1924, P. 137, (G. S. Brooks); No. 1736 in the Canadian National Collection, Ottawa.

Campoplex (Ameloctonus) banffensis n. sp.

Related to *C. (A.) popoffensis* Ashmead.

Female. Length 6 mm.; compared with the original description of *C. (A.) confusus* Vier. this differs as follows. Palpi stramineous, apical half of fore coxae mostly stramineous, mid coxae partly reddish, all trochanters black and yellow, the fore trochanters and the mid distal trochanters mostly yellow, femora reddish, rest of fore legs stramineous, like the rest of the mid legs, hind tibiae dark stramineous, the extensor surface pale at base, second and following joints of hind tarsi blackish on their extensor surface; areola virtually acutely angular at base, apparently as wide as long, partly nearly polished, confluent with the coarsely transversely wrinkled petiolarea; abdomen squarely truncate, the ovipositor apparently shorter than the truncature.

Holotype.—♀, Banff, Alta., June 14, 1922, (C. B. D. Garrett); No. 1740 in the Canadian National Collection, Ottawa.

Campoplex (Ameloctonus) delicatus n. sp.

Related to *C. (A.) popoffensis* Ashmead.

Female. Length 6 mm.; black, scape black, brownish in front, apically yellowish, pedicel brownish-apically, flagel brownish, blackish above, mandibles yellowish, palpi stramineous, tubercles and tegulae yellowish, fore legs including

coxae and trochanters stramineous, their trochanters palest, mid coxae brownish and yellowish, their trochanters yellowish, mid femora stramineous, yellowish at apex, their tibiae concolorous with the femora except on the extensor surface which is mostly yellowish, their tarsi yellowish with the penultimate joint brownish at apex and the ultimate joint dark brownish throughout, hind coxae black, pale at apex, their proximal trochanters blackish and yellowish, hind distal trochanters yellowish, hind femora reddish, hind tibiae stramineous, darkened at apex, yellowish at base, first, second and third joints of hind tarsi yellowish, brownish at apex, the following joints blackish: areola slender, finely sculptured, acutely angular at base, at least three times as long as wide, at the costulae, petiolarea coarsely sculptured, confluent with the areola; abdomen squarely truncate, the ovipositor as long as the truncature.

Holotype—♀, Sudbury, Ont., 1892, No. 1738 in the Canadian National Collection, Ottawa.

Campoplex (Ameloctonus) fuscitarsus n. sp.

Related to *C. (A.) delicatus* Viereck.

Female. Length 6 mm.; compared with the original description of *C. (A.) delicatus* Vier. this differs as follows, scape black, yellow apically in front, pedicel brownish at apex, flagel black, palpi whitish, tubercles partly brownish, fore coxae yellowish, black at base, fore trochanters yellowish, fore femora and tibiae stramineous, their tarsi mostly dark brownish, mid coxae black, yellowish apically, their trochanters yellowish, mid femora reddish, their tibiae and tarsi colored like these parts in the fore legs, hind coxae black, their proximal trochanters black with the apical margin yellowish, hind distal trochanters blackish and brownish, hind tibiae darkened at base also, their tarsi blackish with the basitarsi pale at extreme base; areola separated from the petiolarea, obtusely angled at base, wider than long and finely sculptured, petiolarea coarsely sculptured; abdomen obliquely truncate, the ovipositor apparently shorter than the truncature.

Holotype.—♀, Ottawa, Ont., Oct. 30, 1897, (W. H. Harrington); No. 1739 in the Canadian National Collection, Ottawa.

Campoplex (Ameloctonus) diversus Vier.

Preoccupied by (*Campoplex*) *Campoplegidea* (*Viereckiana*) *diversa* Norton=*C. (A.) cushmani* new name.

Named in honor of R. A. Cushman who called my attention to the duplication of the names.

Campoplex (Ameloctonus) Foerster).

(*Limnerium*) *Campoplex (Ameloctonus) sarthcini* Dalla Torre.

(*Limnerium*) *Campoplex (Ameloctonus) pallipes* Provancher.

(*Amorphota*) *Campoplex (Ameloctonus) perrivalis* Viereck.

(*Amorphota*) *Campoplex (Ameloctonus) galvestonensis* Viereck.

(*Limnerium*) *Campoplex (Ameloctonus) brevicauda* Provancher.

(*Limnerium*) *Campoplex (Ameloctonus) annulipes* Cresson.

(*Limnerium*) *Campoplex (Ameloctonus) guignardi* Provancher.

Campoplex (Diadegma) costata n. sp.

Related to *C. (D.) ruficruris* Viereck.

Female. Length 5 mm.; compared with the original description of *C. (Ecphora) planata* Vier. this differs as follows. Mandibles mostly yellow, tuber-

cles pale brownish, fore coxae black at base, mostly brownish stramineous, fore and mid femora stramineous, extensor surface of mid tibiae pale at base and in the middle, darkened near base and at the apex, hind proximal trochanters black, with an apical yellowish margin, hind distal trochanters stramineous, hind femora reddish, darkened at base and apex, flexor surface of hind tibiae reddish, elsewhere the hind tibiae are yellowish, blackish near base and at apex, hind tarsi blackish, their basitarsi with the basal fourth pale, the second and third joints pale at extreme base; areola nearly acutely angular at base, nearly as wide as long, nearly polished, confluent with the almost transversely costate petiolarea; ovipositor more than twice as long as the truncature.

Holotype—♀, Biburn, Hastings Co., Ont., Oct. 19, 1904, (Evans); No. 1744 in the Canadian National Collection, Ottawa.

Campoplex (Diadegma) ruficruris n. sp.

Related to *C. (D.) sessile* Provancher.

Female. Length 4 mm.; compared with the original description of *C. (D.) planata* Vier. this differs as follows, mandibles mostly yellow, fore and mid coxae black, fore and mid trochanters yellowish, hind trochanters stramineous, blackish above at base, fore and mid femora stramineous, hind femora faintly reddish, hind tibiae pale stramineous, blackish at base and apex, hind basitarsus pale at extreme base, elsewhere blackish like the other hind tarsal joints; areola acutely angular at base, about as long as wide, finely sculptured, confluent with the weakly rugulose petiolarea; abdomen obliquely truncate, the ovipositor longer than the truncature.

Holotype—♀, Hull, Que., Aug. 26, 1894, (W. H. Harrington); No. 1743 in the Canadian National Collection, Ottawa.

Campoplex (Diadegma) partis n. sp.

Related to *C. (D.) costata* Viereck.

Goes to *Ameloctonus degrysei* Vier. by reason of its second abscissa of the discoidal vein which is longer than the third; the recurrent vein is received by the areolet before the middle as in *Callidora*.

Male. Length 7 mm.; antennae black, mandibles black at base and on the lower margin, yellowish along the upper margin and at the base of the teeth, palpi nearly whitish, tegulae half yellowish, half nearly colorless, coxae black, the fore and mid pair brownish stramineous at apex, trochanters yellow, the fore and mid proximal pair brownish stramineous at base, the hind proximal pair black with the apical margin yellowish, femora reddish, the hind pair darkest, and mostly blackish on the outer aspect. fore and mid tibiae and tarsi stramineous, the extensor surface of the tibiae nearly whitish and the apical joints of the tarsi darkened, flexor surface of hind tibiae reddish, the extensor surface yellowish in the middle, pale at base, blackish near base and at the apex, hind tarsi brownish and blackish; second, third and fourth tergites apically obscurely reddish; areola as long as wide, truncate at base, weakly transversely costate, confluent with the rugulose petiolarea.

Holotype—♂, Aylmer, Que., June 3, 1924, (C. H. Curran); No. 1745 in the Canadian National Collection, Ottawa.

Campoplex (Diadegma) curticauda n. sp.

Related to *C. (D.) partis* Viereck.

In Foerster's key this goes also to *Callidora* but lacks the annulate antennae.

Female. Length 6 mm.; black, antennae black throughout, mandibles mostly yellow, palpi yellowish with the tips stramineous, tubercles yellow, tegulae mostly yellow, coxae black, the fore pair with a yellowish tip, proximal trochanters partly black, partly yellowish, distal trochanters yellow, femora reddish, the flexor surface of mid pair blackish at base, outer aspect of hind pair black at base, apex of hind femora with a black annulus, fore tibiae stramineous, their extensor surface yellowish, flexor surface of mid tibiae reddish, their extensor surface yellowish, blackish near base and at apex, flexor surface of hind tibiae blackish, the extensor surface yellowish, blackish near base and at apex, first and second tarsal joints of fore legs stramineous, the remaining joints of fore legs and tarsal joints of mid legs mostly brownish or blackish, hind tarsi black with their basitarsi yellowish at extreme base, abdomen black, the third, fourth, fifth and sixth tergites with an apical yellowish band, the second with a subapical, yellowish band, plica yellow with black spots; areola complete, nearly three times as long as wide at the costulae, truncate at base, finely reticulated, petiolarea a little more obviously sculptured; abdomen squarely truncate, the ovipositor a little longer than the truncature. Recurrent vein received by the areolet a little beyond the middle.

Holotype—♀, Oliver, B. C., April 16, 1923, (C. B. Garrett); No. 1742 in the Canadian National Collection, Ottawa.

Paratype—♀, Nicola, B. C., August 27, 1923, (E. R. Buckell).

Differs from the holotype in having the recurrent vein received by the areolet a little before the middle.

Campoplex (Diadegma) Foerster

(*Limnerium*) *Campoplex (Diadegma) sessile* Provahcher.

(*Limnerium*) *Campoplex (Diadegma) solenobiae* Ashmead.

(*Limnerium*) *Campoplex (Diadegma) hyalina* Provancher.

(*Limnerium*) *Campoplex (Diadegma) eurycreontis* Ashmead.

(*Limnerium*) *Campoplex (Diadegma) pattoni* Ashmead.

Ecphora Foerster.

To this subgenus also belongs the allotype of *Angitia kiehtani* Vier. and possibly the type. The allotype of *A. kiehtani* Vier. has no prominent spiracles on the first tergite and is related to *E. oedemisiformis* Vier.

Campoplex (Ecphora) planata n. sp.

Related to *C. (E.) oedemisiformis* Vier.

Female. Length 6 mm.; black, antennae black, scape and pedicel brownish at apex in front, mandibles brownish yellow, black at base, palpi stramineous, tegulae mostly yellow, coxae black, rest of fore and mid legs stramineous save for their femora which are rather reddish, apical tarsal joint of mid legs, brownish, hind proximal trochanters black and brownish, their distal trochanters dark stramineous, hind femora reddish, hind tibiae reddish with their extensor surface pale at base and blackish at apex, hind tarsi blackish, their basitarsi with the basal third mostly yellowish, the second and third joints pale at extreme base; areola truncate at base, wider than long, confluent with and nearly as coarsely sculptured as the petiolarea; abdomen squarely truncate, the ovipositor longer than the truncature.

Holotype—♀, Keremeos, B. C., June 28, 1923, (C. B. Garrett); No. 1741 in the Canadian National Collection, Ottawa.

In my key above this is included in the key to species of *C. (Diadegma)*.

This species differs from *C. (E.) oedemisiformis* Vier. in having its abdominal tergites all black, etc.

Campoplex (Ecphora) canadensis n. sp.

Goes to *Ecphora* in Foerster's key to Campopleginae and if correctly placed proves that this is untenable even as a subgenus.

Female. Length 9 mm.; compared with the original description of *C. (E.) planata* Vier. this differs as follows: Flagel partly brownish beneath, scape and pedicel black or blackish at apex, mandibles mostly yellow, black at base, palpi yellowish, fore and mid coxae partly reddish, black at base, extensor surface of fore and mid tibiae yellowish at base, apical tarsal joints of fore and mid legs concolourous with the other tarsal joints, hind proximal trochanters stramineous like the other trochanters, hind femora blackish at apex of the extensor surface hind tibiae stramineous, black near base and at apex and yellow at base, hind tarsi black, the first, second and third joints yellowish at base; areola truncate at base, polished, confluent with the transversely costate petiolarea, the petiolarea and areola concave; ovipositor over twice as long as the truncature.

Holotype—♀, Ottawa, Ont., (W. H. Harrington); No. 1747 in the Canadian National Collection, Ottawa.

Campoplex (Ecphora) alternatus n. sp.

Related to *C. (E.) canadensis* Viereck.

Female. Length 7 mm.; compared with the original description of *C. (E.) planata* Vier. this differs as follows. Scape and pedicel mostly or entirely brownish in front, palpi partly brownish, tegulae mostly blackish, proximal trochanters mostly black, the distal trochanters, femora and fore and mid tibiae reddish, apical half of extensor surface of mid tibiae blackish, hind femora blackish at apex, tarsi mostly black, hind tibiae black save for a reddish streak on the flexor surface at base; areola bounded at base by trenchant carinae, truncate, finely sculptured, confluent with the rugulose petiolarea, wider than long; ovipositor nearly three times as long as the oblique truncature.

Holotype—♀, Seven Isles, Que., Aug. 9, 1924, (F. W. Waugh); No. 1746 in the Canadian National Collection, Ottawa.

Campoplex (Ecphora) Foerster

(*Angitia*) *Campoplex (Ecphora) kiehtani* Viereck.

Related to *C. (E.) oedemisiformis* Viereck.

Campoplex (Angitia) Foerster

(*Limnerium*) *Campoplex (Angitia) pterophorae* Ashmead.

(*Limnerium*) *Campoplex (Angitia) macer* Cresson.

(*Limnerium*) *Campoplex (Angitia) rivalis* Cresson.

(*Limnerium*) *Campoplex (Angitia) obscura* Cresson.

(*Limnerium*) *Campoplex (Angitia) euurae* Ashmead.

Cymodusa Holmgren.

(*Limnerium*) *Cymodusa fusiforme* Provancher.

(*Limnerium*) *Cymodusa mississippiensis* Ashmead.

(*Mesoleptus*) *Cymodusa distincta* Cresson.

Pseuderipternoides Viereck.

(*Olesicampa*) *Pseuderipternoides melanerythrogaster* Viereck.

(*Mesoleptus*) *Pseuderipternoides porrectus* Cresson.

Neonortonia Viereck.

(*Neonortonia*) *hullensis* Vier. = *Ischnoscopus* Foerster.

(*Angitia*) *Neonortonia autumnalis* Viereck.

(*Casinaria*) *Neonortonia eupitheciae* Viereck.

Pyracmonoides Viereck.

(*Pyracmon*) *Pyracmonoides macrocephalum* Provancher.

Parapyracmon Clement.

1924, Deutsch, Ent. Zeitschr. (112, 117).

Nine species.

Type—*P. melanurus* Holmgren. (By present designation).

The remaining eight species are possibly referable to *Pyracmonoides* by reason of their clypeus being more or less toothed in the middle of the anterior margin.

R. A. Cushman in litt. says that *Pyracmonoides* Viereck is synonymous with *Helcostizidea* Rohwer, but this synonymy is not evident through a perusal of the original description of *Helcostizidea* Rohwer, in which it is said that the clypeus has the apical margin depressed.

Sesioplex Vier.

(*Limmerium*) *Sesioplex validus* Cresson.

(*Limmerium*) *Sesioplex heliae* Ashmead.

**FOUR NEW SPECIES OF PARASITES FROM APHIDOPHAGOUS
SYRPHIDAE (HYMENOPTERA).**

BY M. KAMAL,

Berkeley, Calif.

ENCYRTIDAE

Bothriothorax faridi n. sp.

This species has been named after the late Egyptian nationalist M. Farid Bey, whose sacrifices in the field of patriotism are memorable to every Egyptian.

Characters of the adult:

Female.—Length, 2.6 mm., expanse 5.4 mm., greatest width of fore-wing, 9 mm., Axillae well separated at tips; eyes naked, face uniformly punctate, cheeks slightly punctured and faintly shagreened, face and vertex with large, densely compact, deep and regular arranged circular depressions, becoming sparser, smaller and widely scattered on lower face; prothorax carries a few faintly developed punctures; punctations on mesoscutum are more irregular, much smaller and shallower than on vertex. The individual punctures are separated by wide spaces, each puncture with a central umbilicus; scutellum resembles scutum except that it is lacking the punctures at tip but shagreening persistent. Axillae with about five small depressions at the basal half, while the other half is smooth; tegulae punctured and shagreened; propodeum shagreened; abdomen smooth, except second and two last segments which are shagreened, last abdominal segment shagreened on venter. Ovipositor .11 mm. in length with long fine hairs on both sides till the tip. Antenna 1.5 mm. long, eleven jointed, stout and clavate; flagellum a little

over twice as long as scape, the radical joint slightly smaller than the pedicel, first funicle joint more than one-half as long as pedicel, joint 2 almost equal to joint 1, joints 3, 4, 5, and 6 equal, and each a little wider than its preceding joint, club flattened obliquely truncate to half its length. General color metallic bluish green; antennae black except the scape which is dark amber, all legs dark honey yellow, hind tibiae piceous; wing veins brown, wings hyaline with bluish iridescent lustre.

Male similar to the female with the exception that the antennae are more slender and the segments less compact; the first funicle joint is cylindrical and only slightly longer than the pedicel. The punctation on the mesonotum and mesoscutellum similar to that on the face and vertex, more regular, larger and more distinct than in the female. The punctures on the scutellum cover two-thirds the length thus leaving the apical third visibly impunctate but shagreened. Described from seven females and four males (holotype female, allotype and paratypes) reared from *Syrphus opinator* collected on April 15, 1925, at Milpitas, California. Type specimens have been deposited in the U. S. National Museum.

CHALCIDIDAE

Syrphophagus smithi n. sp.

This species has been named for Professor Harry S. Smith for his valuable contributions to the field of biologic control.

Characters of the adult:

Female.—Length 2.2 mm., bluish black, with metallic green or purple lustre. Head slightly wider than prothorax; front, face and lower edge of the eye bright purple; clypeus, metallic green; mandibles and labrum shiny black, the former being broad, heavy and tridentate; genae metallic green; vertex metallic green and markedly punctate; eyes black and pubescent. Thorax with metallic tinge and sparsely pubescent; mesonotum covered with minute pores; scutellum cupreous with small, scattered elevations. Abdomen aneneous, short, triangular and terminating into a moderately long, about .15 mm., punch-like black ovipositor. Antennae 11 jointed; brownish black; scape black, very long, as long as the rest of the other joints combined excepting penultimate and club; pedicel as long as the two following funicular joints; first funicle joint the smallest, as long as wide; the following three joints almost equal in length and width, the other two are slightly longer and widening towards tips; the club clavate with truncate apex to almost one-third its length. Metapleura metallic green; mesopleura purple; coxa and femur of hind legs brownish black; tibia light brown especially near end, the spur very short, tarsus honey yellow excepting last joint, being black, middle legs resemble the hind pair except that the tibial spur is very long, as long as metatarsal joint; forelegs same as the hind, the tarsal tips being black; wings hyaline, with closely set small brown hairs on the wider part of the membrane: submarginal vein long with six fine long hairs: marginal as long as the stigmal with the edge densely clothed with hairs, about three times as long as those on the membrane. There is also a group of hairs as long as those on the marginal vein extending from the stigmal to the inner margin of the wing towards the base. Described from twelve females (holotype female, and paratypes) reared from *Syrphus opinator* and *S. nitens* on May 10 and June 12, 1925 at Alhambra and Pasadena, California. Type specimens have been placed in the U. S. National Museum.

CERAPHROMIDAE

Conostigmus zaglouli n. sp.

This species is named for his Excellency, Zagloul Pasha, the present national leader of Egypt and the world wide known statesman.

Characters of the adult.

Female.—Length varies from 2.75 to 3.7 mm., excluding ovipositor; shining black; head and thorax finely alutaceous; antennae black or brownish black with dark amber radical joints; legs brown, the posterior coxae darker; abdomen polished pitchy black, canoe-like in shape and slightly keeled on the venter, ovipositor long, about .2 mm. in length, light amber, sickle-like, projecting dorsally from apex of abdomen and slightly curved towards the head; thorax and sides of last abdominal segment distinctly hairy. Thoracic pleurae pubescent and shagreened. Eyes large, black or dark brown, prominent and pubescent. Labrum light amber in color; mandibles dark brown, blackish at tips and along the edges, crescent-like, broad at base and pointed at tips; palpi four-jointed and honey yellow in color. Axillae almost touch at tips; scapular and scutal sutures visibly punctured along their entire length. Antennae long, a little over half the length of the body, 11 jointed, the scape long, slightly longer than the three successive segments combined, the pedicle small about half as long as the first funicle joint, the first flagellar the longest; the second is shorter than the first, the third is as long as the second, the fourth and following joints to the penultimate, stouter, of a uniform shape and an equal length, the last more slender, cone-shaped and slightly longer than the five preceding joints. Wings, hyaline, pubescent, stigmal area large, dark brown, notched at the point where it joins the submarginal, the stigmal vein is long, more than half the length of the submarginal.

Male corresponds exactly to the female in size, color and other characters; however, the sex differences lie chiefly in the antennae which are longer, the joints more widely separated and covered with dense pubescence. Antennae 11 jointed, filiform about two-thirds the length of the body; the scape long, stout and slightly curved ventral, almost as long as pedicel and first two funicle joints combined; pedicel shortest of all segments, truncate at its outer edge near base; flagellum almost cylindrical with the first seven joints densely hairy, the first joint about four times as long as thick, the following joints very slightly thinner but about equal in length; the last is more slender, having no hairs and is a little longer than the preceding. There is a markedly depressed area just above the antennal line in both sexes. Described from ten females and five males (holotype female, allotype and paratypes) reared from syrphid puparia collected on April 20, 1925 from Milpitas, California (Roy Campbell); and from Hollywood, California by the writer on May 15, 1925. Type specimens have been deposited in the U. S. National Museum.

Conostigmus timberlakei n. sp.*Characters of the adult:*

Female.—Length 2.0 mm. black, shining; head and thorax finely alutaceous; antennae blackish; legs yellowish-brown, coxae and femora blackish-brown; abdomen polished black; eyes black, not very large and almost without pubescence; mandibles strong, deeply dented into two teeth, tips black and the rest brown. Antennae eleven jointed, flagellate; the scape long, projecting far beyond the ocelli

and a little longer than the next three joints combined; pedicel more than half the length of the first joint of flagellum, the latter being the longest joint and almost as long as the last; the second to the penultimate, inclusive, nearly of equal length and width; the last more slender, tapers to a point, smaller and slightly longer than the penultimate. Wings hyaline, pubescent, with a large, brownish stigmal area and a long stigmal vein. The ovipositor is very small and hardly visible. Described from three females (holotypes) reared from syrphid puparium collected by the writer from San Diego, California on April 23, 1926.

BOOK REVIEW

Heteroptera or True Bugs of Eastern North America with Especial Reference to the Faunas of Indiana and Florida. By W. S. Blatchley; published by The Nature Publishing Company, Indianapolis. Pp. I-IIII6, 215 text figures and 12 partial plates. 1926.

Entomologists and others who are familiar with his previous, useful works will be pleased to learn that Dr. W. S. Blatchley has recently published another comprehensive manual on North American insects. In the simple but thorough manner in which he has made known the Coleoptera of Indiana and the Orthoptera of Northeastern United States, he has now described the Heteroptera or true bugs of eastern North America. The first twenty-eight pages of his new manual are devoted to general remarks, acknowledgment, structures used in classification, habits and entomological technique. In the following 1055 pages he gives descriptions and distributional notes of 1253 species and subspecies, as well as the descriptions of the forty families he recognizes and their respective subfamilies and tribes. One subfamily, four tribes, one genus, twenty-four species and four subspecies are described as new or worthy of recognition. As the classification and sequence adopted represent the author's opinion, they differ somewhat from those given in Van Duzee's Catalogue of the Hemiptera. The most noticeable changes are due to the new facts that have been published since 1917, and the groups and subfamilies that he has elevated to family rank. Even though "this manual has been prepared mainly for the use of the tyro and not for the specialist," nevertheless all entomologists, including specialists, as well as the general student, will find his book a very useful one. For his long and painstaking labor in bringing together in one volume the scattered descriptions and information on the true bugs of Eastern North America, Dr. Blatchley deserves much credit and praise.

Wm. J. Gerhard.

